

PHYS040B: Formulae

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0 General relationships

$$\mathbf{F}_{\text{net}} = m \frac{d^2 \mathbf{x}}{dt^2}$$

$$\mathbf{F} = -\nabla U$$

$$U = - \int \mathbf{F} d\mathbf{x}$$

$$K = \frac{p^2}{2m}$$

$$a_r = \frac{v^2}{r}$$

$$W = -\Delta U$$

1 Gravitation

$$\mathbf{F} = \frac{Gm_1m_2}{r^2} \hat{r}$$

$$U = -\frac{Gm_1m_2}{r}$$

$$v = \sqrt{GM/r}$$

$$T^2 = \frac{4\pi^2}{GM} r^3$$

2 Fluids

$$P = \frac{F}{A}$$

$$P = P_0 + \rho g d$$

$$F_1 = \frac{A_1}{A_2} F_2 + \rho g h A_1$$

$$F_B = \rho_f V_f g$$

$$v_1 A_1 = v_2 A_2$$

$$P + 1/2 \rho v^2 + \rho g h = \text{constant}$$

3 Oscillations

$$x(t) = A \sin \omega t + \phi$$

$$\omega = \sqrt{k/m}$$

$$v_{\text{max}} = A\omega$$

$$T = 2\pi \sqrt{m/k}$$

$$U = 1/2 k x^2$$